UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,691	04/14/2004	Yusheng Zhao	S-102,389	8078

35068 7590 05/16/2005

UNIVERSITY OF CALIFORNIA
LOS ALAMOS NATIONAL LABORATORY
P.O. BOX 1663, MS A187
LOS ALAMOS, NM 87545

EXAMINER	
HOFFMANN, JOHN M	
ART UNIT	**PAPER NUMBER**
1731	

DATE MAILED: 05/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/824,691	ZHAO ET AL.	
	Examiner	Art Unit	
	John Hoffmann	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-22* is/are pending in the application.

4a) Of the above claim(s) *8,9 and 17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6,7,10-16 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claims 8-9 and 17 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 29 April 2005.

Information Disclosure Statement

The following applies to the references for which they are lined through on the 1449 form:

The information disclosure statement filed 14 April 2004 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the dates of publication (for non-patent documents are not provided. From MPEP 609(III) : **The date of publication**

> **supplied must include at least the month and year of publication, except that the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue.**

It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the

statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6-7, 10-16 and 18-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6: step (a) is not understood as to what how "and/or" should be interpreted. Furthermore the claim is not understood because if one ball mills graphite, one assumes at most there is mechanical subdivision of graphite: only smaller pieces of the same graphitic carbon could result – no amorphous carbon would result. Additionally, the "amorphous...graphitic carbon" is not understood. Graphite is a crystalline phase: some thing cannot be both amorphous and crystalline – they are mutually exclusive conditions.

Claim 18: there is no antecedent basis for "the amorphous mixture". More importantly, the only mixture disclosed appears to be crystalline in nature.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 6-7 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corrigan 4289503 in view of Kume 5536485 and/or Geyer 5211727.

Step a) From col. 4, line 59 to col. 5, line 5 of Corrigan discloses the use of a hexagonal BN powder with a maxiumum dimension of 100 nm. Thus it is deemed that this discloses the limitation relating to "nano" It is also noted that col. 9, line 25. And finally Examiner notes that size is generally not a patentable invention – it would have been obvious to make the Corrigan grains as small as desired – depending upon how fine of an abrasive is desired.

Col. 6,lines 4-5 disclose the use of graphite to prevent the particles form fusing. It would have been obvious to use graphite on the same size (or smaller) as the BN size, so that the graphite can be situated between the BN grains to prevent their fusion.

Corrigan does NOT disclose the ball milling of the mixture.

Step b) : figures 1-4 of Corrigan disclose the encapsulation.

Step c) : Col. 6, lines 10-12 discloses sintering at 2273K-2573 K, and 6.5-7.5 GPa (as Examiner converts it).

As to the result being "superhard" it is deemed that at least the BN portion is. Alterntivatively, it is deemed that it is "superhard" as compared to a pillow or a marshmallow.

As to being B-C-N, it is deemed that the broadest reasonable interorettation of this is that it is $B_xC_yN_z$, where x, y and z are not negative. For Corrigan, x and z are 1 and y = 0. This is deemed to be the broadest reasonable interpettation for "B-C-N";

examiner could not find another definition for such in the prior art, specification or any text book.

The PTO gives a disputed claim term its broadest reasonable interpretation during patent prosecution. Hyatt, 211 F.3d at 1372. The "broadest reasonable interpretation" rule recognizes that "before a patent is granted the claims are readily amended as part of the examination process." Burlington Indus. v. Quigg, 822 F.2d 1581, 1583 (Fed. Cir. 1987). Thus, a patent applicant has the opportunity and responsibility to remove any ambiguity in claim term meaning by amending the application. In re Prater, 415 F.2d 1393, 1404-05 (CCPA 1969). Additionally, the broadest reasonable interpretation rule "serves the public interest by reducing the possibility that claims, finally allowed, will be given broader scope than is justified." In re Am. Acad. of Sci. Tech. Ctr., 367 F.3d 1359, 1364 (Fed. Cir. 2004) (quoting In re Yamamoto, 740 F.2d 1569, 1571-72 (Fed. Cir. 1984)).

As to "amorphous diamond-like carbon grain boundaries". It is deemed that since applicant got such, that Corrigan would get such.

As to the ball-milling, it is well known in the art to use a ball mill to disagglomerate the ceramic material. See col. 3, lines 62-65 of Geyer and Kume, col. 47, line 44 to col. 48, line 11 for evidence of such. It would have been obvious to ball mill the Corrigan mixture so as to disagglomerate the powder (which is a well known process) in keeping with the Corrigan teaching of not letting the particles fuse together.

Claims 7 and 10: it would have been obvious to use as much carbon as desired to prevent the particles from fusing. One of ordinary skill would recognize that the more carbon is used, that the further the BN particles would be from each other – which would make it more unlikely they could be close enough to fuse together.

Claims 19-22 it is deemed that the compact would have areas of hardness that are the same as applicant, because performing the same process as applicant should result in the same product.

Claims 6-7, 10-16 and 19-22 -are rejected under 35 U.S.C. 103(a) as being unpatentable over Adadurov 4483836 in view of Kume 5536485 and/or Geyer 5211727.

Adadurov discloses the invention as claimed, except for the ball milling. Such would have been obvious in view of Kume and/or Geyer as discussed above.

Example 33 of Adadurov discloses the use of graphite and boron nitride. Col. 4, lines 11-18 suggests the use of carbon down to sized 10 nm. Feature 1 is the capsule in which the material is encapsulated.

As to step c) examiner notes the claim refers to "a pressure" of about 5-25 GPa and "a" temperature of about 1000-2500K. But 1000-2500K is a range of temperatures, not a single temperature. There are various ways to interpret such limitations, as examples (1) "a temperature within the range1000-2500 but no other temperature within or outside of the range", (2)"a temperature that starts at 1000 and ends at 2500" and (3) "a temperature within the range1000-2500 but can include other temperatures within the range." It is the Office's responsibility to use the broadest reasonable interpretation.

The PTO gives a disputed claim term its broadest reasonable interpretation during patent prosecution. Hyatt, 211 F.3d at 1372. The "broadest reasonable interpretation" rule recognizes that "before a patent is granted the claims are readily amended as part of the examination process." Burlington Indus. v. Quigg, 822 F.2d

1581, 1583 (Fed. Cir. 1987). Thus, a patent applicant has the opportunity and responsibility to remove any ambiguity in claim term meaning by amending the application. In re Prater, 415 F.2d 1393, 1404-05 (CCPA 1969). Additionally, the broadest reasonable interpretation rule "serves the public interest by reducing the possibility that claims, finally allowed, will be given broader scope than is justified." In re Am. Acad. of Sci. Tech. Ctr., 367 F.3d 1359, 1364 (Fed. Cir. 2004) (quoting In re Yamamoto, 740 F.2d 1569, 1571-72 (Fed. Cir. 1984)).

It is presumed that the broadest reasonable interpretation of step c) is substantially: sintering such that at least one pressure (in the 5-25 GPa range) is obtained and that at least one temperature (within the 1000-2500 K range) is obtained.

Examiner realizes that the above broadest reasonable interpretation may not be completely "reasonable", however there does not appear to be any interpretation which is clearly completely reasonable. If Applicant considers the broad interpretation to be unreasonable and Applicant does not wish to the exercise the "*opportunity and responsibility to remove any ambiguity in claim term meaning by amending the application* " , then Applicant should point out why the Office's interpretation is not the "broadest reasonable", what the broadest reasonable interpretation is, and preferably point out why it is reasonable. Mere argument that the Office's interpretation is incorrect (and giving no guidance/suggestion as to what the correct interpretation is) will likely be deemed as non-responsive.

Claim 1 of Adadurov discloses that the temperature and pressure varies in a manner that for at least some time period the pressure value and the temperature value is met.

As to the grain boundaries and the other structural limitation of Applicants step c), it is deemed that since Adadurov and Applicant practice substantially the same process, that the substantially the same product would result. It is noted that: col. 5, lines 14-34 of Adadurov suggests the mixture of carbon and BN can be in the form of granules. It is deemed that the granules would be transformed into bulk material.

Claim 7: example 33 teaches equal parts by weight.

Claim 10: col 5, line 5 teaches using "various fractional compositions". IT would have been obvious to use the 4:1 ratio – depending upon what final product is desired.

Claims 11-16: are clearly met when using the above mentioned broadest reasonable interpretation because all of the pressures and temperature were achieved during the Adadurov explosion.

Claims 19-22 it is deemed that the compacted granules would have areas of hardness that are the same as applicant, because performing the same process should result in the same product.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 6 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Huang "Structure and phase characteristics of amorphous born-carbon-nitrogen under high pressure and high temperature".

Applicant does what is disclosed in Huang. For example see section II. Thus the same results should be obtained. It is deemed that the carbon is "diamond like". See Clevenger US Patent 6348395, col. 4, lines 52-54 which suggests that nearly any form of carbon can be "diamond-like" carbon. It is deemed that any material that comprises carbon is "like" a diamond because both contain carbon atoms.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang as applied to claim 6 above, and further in view of Solozhenko et al "Synthesis of superhard cubic BC2N" .

Huang does not disclose the use of the claimed capsule. Solozhenko discloses the use of a rhenium capsule. It would have been able to use the Solozhyenko rhenium capsule – depending upon what apparatus is readily available to produce the needed temperatures and pressures.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Hoffmann whose telephone number is (571) 272 1191. The examiner can normally be reached on Monday through Friday, 7:00- 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

5-12-05

John Hoffmann
Primary Examiner
Art Unit 1731

jmh